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Sustainable rural development through integrated agritourism, rural tourism, and ecotourism: A bibliometric review



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Abstract

This study introduces a new approach to assessing the role of integrated rural tourism, including agritourism, ecotourism, and rural tourism, in sustainable rural development. Going beyond the traditional “Triple Bottom Line” approach based on economic, social, and environmental factors, this study adds elements of an expanded perspective that includes governance, technological innovation, and good health and well-being in assessing sustainable rural development. The result clarifies this field’s leading trends and interactions from 1990 to 2024. Additionally, the research builds a knowledge framework to promote long-term sustainability and transformative growth in rural areas while clarifying challenges and future research directions. Harmonizing these three types of tourism, agricultural development, and rural sustainability will lead to improvement. The findings contribute to our understanding of sustainable tourism practices and provide insights for policymakers and industry stakeholders striving to improve rural development initiatives.

Keywords: Sustainable rural development; Integrated rural tourism; Agritourism; Ecotourism; Rural tourism.

1. Introduction

Efforts to promote comprehensive sustainable rural development (SRD) often emphasize the integration of three main types of tourism: agritourism (AT), rural tourism (RT), and ecotourism (ET), collectively known as “integrated rural tourism” or IRT (Roman & Kawęcki 2024; Yeager et al. 2024). This concept is gaining global attention because it optimizes resources and fosters a sustainable, multi-dimensional development model. IRT is deemed an essential and meaningful

model amid the depletion of resources and environmental degradation, which necessitates a tourism development model that balances economic, social, and environmental factors (Belliggiano et al. 2020; Gao & Wu 2017; Zhang et al. 2015). The IRT approach is imperative for diversifying income sources and reducing dependence on a single economic sector. It aids in conserving cultural values and agricultural heritage while protecting the natural environment through green and sustainable tourism activities, organic farms, and smart villages (Ciolac et al. 2022; Hussain et al. 2023). Moreover, it encourages local community participation and enhances the quality of life, contributing to comprehensive and sustainable socioeconomic development (Hussain et al. 2023). Post-COVID-19, there has been a rise in technological innovations and wellness tourism types such as Airbnb in rural villages, improving management and tourism experiences as well as the mental and physical health of residents and tourists (Pesonen & Kompula 2010; Xue & Shen 2022). Notably, empow-

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ering women in tourism activities significantly contributes to community development reduces gender inequality, and encourages the active involvement of all members of society (Quang et al. 2023). The trend toward digital technology innovation plays a vital role in managing and developing rural tourism. Technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Big Data, Augmented Reality (AR), and Virtual Reality (VR) help optimize management processes, promote tourism effectively, and enhance the authenticity of the tourist experience, thereby increasing satisfaction and loyalty (Hussain et al. 2023; Park & Lee 2019). Furthermore, wellness models are being integrated into the IRT model, introducing new and unique types of tourism in rural areas and attracting many tourists. IRT provides a serene space close to nature, enabling visitors to relax and rejuvenate. This model meets tourism needs while improving visitors' mental and physical health (Xue & Shen 2022). IRT diversifies the rural economy and fosters community participation, ensuring economic development is balanced with environmental protection. The active involvement of local communities guarantees that economic benefits are distributed fairly and sustainably, enhancing the quality of life and social stability (Klakočar & Pavić 2024; Tiwari & Nguyen 2024).

To the best of the authors' knowledge, this study is the first effort to integrate the three primary types of tourism, Agritourism, Rural Tourism, and Ecotourism into a cohesive IRT model. This study is an extension beyond the conventional Triple Bottom Line framework to explore the multifaceted impacts of IRT, including innovations in digital technology, empowering policies, and improving quality of life. The research delves into emerging trends, international collaborations, and topic developments to identify future research prospects and explore existing gaps. Additionally, it presents a concept knowledge framework that investigates the interactions among the three tourism types and their contributions to SRD while assessing challenges and outlining future research avenues and scientific inquiries. The following are three research objectives for the work:

(1) Analyze the research progress of SRD through collaboration, co-occurrence of keywords relationships, and trends and dynamics of key themes,

providing a comprehensive, multidimensional view of the field's development.

- (2) Create a theory-based, new knowledge framework for this field that helps create a logical and unique understanding of how IRT research impacts SRD.
- (3) Identify current challenges and future research directions, supporting future scholars in conducting more extensive research.

The paper begins with an introduction and a theoretical background on SRD. Afterward, it presents the methodology, followed by the analysis of results, discussion, and conclusion. Additionally, the paper addresses current challenges and future research directions, offering valuable insights and practical recommendations for policymakers and researchers in these fields.

2. Theoretical Background

2.1 Triple Bottom Line theory and sustainable development

The triple bottom line (TBL) theory, which measures the performance and sustainability behavior of companies by considering three aspects—economic, social, and environmental—is considered “a great and far-reaching metaphor” (Elkington & Rowlands 1999; Henriques 2013). The TBL provides a tool to evaluate the performance and success of organizations by measuring their impacts in the economic, social, and environmental areas, which is considered a practical framework for sustainable development (Nogueira et al. 2023). The TBL has expanded the traditional financial reporting framework to also address social and environmental impacts, reflecting a shift from focusing solely on profits to a more multidimensional view of sustainable development related to society and the environment in order to optimize the use of resources efficiently and sustainably and to support future generations (Sala 2020). This includes maintaining long-term profitability while protecting natural resources and creating social value. The social dimension refers to the responsibility of organizations towards the community, including implementing fair labor practices, promoting community participation, and improving the quality of life for local populations (Cheng & Xu 2021). Organizations that apply TBL are expected to deliver responsible

and equitable operations. Finally, the environmental dimension of TBL emphasizes minimizing the negative impact of economic activities on the environment through saving resources, reducing emissions, and protecting biodiversity (Sala 2020). The TBL model has become an important tool in assessing sustainable development in many different fields. This is clearly demonstrated by the fact that before 1990, this term was not popular, but now, a simple search on Google can return more than three million results related to TBL, a sharp increase from the 52,400 results found in 2004 (Norman & MacDonald 2004). However, in the current development trend, TBL has been expanded due to its limitations in addressing the complexity of sustainability in modern organizations.

2.2 SRD and factors beyond the TBL model

The original TBL model assessed sustainable development based on economic, social, and environmental factors, and it has been applied in many studies to assess sustainable development in different fields (Elkington & Rowlands 1999). However, in the context of SRD, this model needs to be expanded to fully respond to factors affecting sustainable development in line with modern development trends and new global challenges. One of the necessary factors to expand TBL in rural development is tourism, especially when it integrates models such as agritourism, ecotourism, and rural tourism, which have become an indispensable part of sustainable development strategies in rural communities. Additional factors, such as governance, technology, and public health, have been studied recently based on rapid social change and the need for comprehensive development (Apostolopoulos et al. 2020). Governance helps improve policy and community engagement, technology supports the optimization of tourism management and the protection of cultural heritage, while public health promotes sustainable development through IRT models (Mihai et al. 2021; Yanan et al. 2024). Many previous studies have shown that the expansion of TBL in tourism models such as agriculture, eco-tourism, and rural tourism promotes economic development, improves the quality of life, and preserves cultural values (An & Alarcón 2020; Tang & Xu 2023; Cheng & Xu 2021). In particular, digital technology and public participation are important in enhancing management effectiveness and sustain-

able development (Jiang et al. 2023). The current study has expanded the TBL model to link these elements with the typical sustainable development goals (SDGs) governance for SDG 16, technology for SDG 9, and public health for SDG 3, creating a more comprehensive rural development framework. Based on recent studies and development trends, the study develops a theoretical framework for sustainable rural tourism development based on IRT.

3. Methodology

3.1 Bibliometric approach

The bibliometric is a quantitative method that uses bibliographic databases to analyze and predict research trends, while clarifying research structures and systems (Donthu et al. 2021; Merigó & Yang 2017). The bibliometric method has become popular, as evidenced by an analysis of 18,432 scientific studies published between 1980 and 2023 that included bibliometric analysis (Iri & Ünal 2024). This method allows for tracking research trends, evaluating academic results, and understanding scientific collaborations through quantitative information analysis for forecasting and decision-making (Lazarides et al. 2023). This method applies mathematical and statistical techniques to analyzing scientific documents to explore the conceptual structure and development of research topics (Pranckutė 2021).

In order to meet the research objectives in this work, bibliometric analysis was chosen as an effective way to collect and identify basic information about publications in the field. This study identifies influential authors and publication sources and the most influential countries, which is especially meaningful for the direction and strategy of cooperation (Valenzuela-Fernández et al. 2018). Notably, the study builds a visual map of the relationship between countries and international research collaborations, assesses the role of countries in the global scientific community, identifies important research centers, and discovers new cooperation opportunities. We conduct a co-occurrence analysis of keywords in scientific articles. This analysis helps to identify relationships between research topics and the connections between keywords in different research clusters. The term co-occurrence of keywords is the simultaneous appearance of two or

more keywords in a research paper, indicating a connection or relationship between research concepts. Through this, important research trends are clarified, helping to build an overview of the development of the research field over time. In combination, we use a thematic map construction tool, a powerful visualization method to describe the relationships between major research topics, highlighting centrality and community structure, to illustrate hot topics and their connections (Nica 2024; Rusydiana 2021). This map helps identify prominent topics and shows their distribution and changes in scientific publications. The topic map helps researchers easily identify key areas and major research trends in the field. In addition, current trends in research topics are analyzed to understand better the topics that are attracting attention and developing strongly over time, the basis for identifying challenges and potential research opportunities. Staying abreast of current trends will help researchers stay updated on the latest developments and emerging challenges in their field and guide future research directions.

3.2 Research design and data collection

A reliable and complete dataset is a prerequisite for bibliometric research, as it ensures accurate analysis and visualization of publication trends (Passas 2024; Rogers et al. 2020). This study used a set of documents retrieved from the Web of Science (WoS) for several reasons:

- (1) WoS applies strict selection criteria, ensuring only high-quality, peer-reviewed journals are included, making the retrieved documents reliable, trustworthy, and highly relevant for academic research (Pranckutė 2021)
- (2) The database offers a wide range of journals and articles, ensuring researchers have access to essential documents and stay updated on the latest developments (Birkle et al. 2020).
- (3) WoS is ideal for bibliometric analysis due to its compatibility with software like VOSviewer, Biblioshiny, CiteSpace, etc. (Jing et al. 2024).

Building on previous studies on bibliometric reviews and establishing a good keyword strategy ensures the representativeness of studies identified in bibliometric reviews, influencing the quality of the results (Arici et al. 2023; Harari et al. 2020). This study

fully complies with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol guidelines to ensure transparency and quality in its implementation, presenting total systematic relations and comprehensive analysis (Page et al. 2022). This study applied PRISMA to ensure transparency, systematization, and reproducibility in the document selection process (Page et al. 2022). The use of PRISMA in bibliometric review is consistent with recent research trends when many researchers have applied this method to standardize the document screening process, minimize bias, and improve the quality of analysis (Nica 2024; Rusydiana 2021). Each step, from data collection to data synthesis, ensures transparency, completeness, and accuracy. Using the procedure, cleaning, checking for synonyms, and expanding keywords were performed thoroughly. Specifically, the process consists of four steps: identification, screening, eligibility, and inclusion.

Step 1 – Identification: We conducted multiple searches and tested many keyword strategies during November 2024, resulting in the selection of keywords for the study: (“Integrated Rural Tourism” OR “rural tourism” OR “ecotourism” OR “agritourism” OR “agrotourism”) AND (“Sustainable Rural Development” OR “sustainab* development”) AND (“impact*” OR “effect*” OR “role”). After searching, 1130 relevant publications were found.

Step 2 – Screening: In step 2, the 1130 documents from step 1 were screened, selecting only journal articles written in English to ensure consistency in the analysis (Arici et al. 2023; Harari et al. 2020).

Some documents were deemed irrelevant to the research topic, even though they were indexed in search engines. We conducted a manual screening to find documents relevant to the research topic. They relied on abstracts and titles to ensure they were relevant to the research scope and contained at least two keywords in the article. The results obtained 987 articles focusing on the research topic.

Step 3 – Eligibility: The 987 articles collected from step 2 were subjected to a rigorous standardization process (Taskin & Al 2019), including the author’s name, journal origin, and the existence of the journal at present. This process resulted in 964 collected articles, which were retained for bibliometric analysis. To further support the analysis and build a knowledge framework on the impact of IRT on SRD, the research

team continued to screen and select high-quality articles from reputable journals in the next step.

Step 4 – Data synthesis: This process was conducted using the 964 articles retained from step 3 to perform a comprehensive bibliometric analysis. Furthermore, these articles demonstrate precise research methods, convincing results, new contributions to theory and practice, structured presentation of ideas, and linkage to current research and have reliable references (Chiu et al. 2014), and were structured coherently and relevant to the research topic (Ting & Cheng 2017). This process was carried out within a week. As a result, we narrowed the list to 31 articles that were the most relevant and used them for in-depth analysis in a cluster and knowledge framework, citation, and further clarification in the co-occurrence of keywords analysis.

There are many tools to support bibliometric analysis, but each tool has different outstanding features. Combining VOSViewer and Biblioshiny can enhance bibliometric analysis by leveraging the strengths of both tools. VOSviewer is known to be superior in creating visual representations of complex bibliometric data, allowing researchers to map topics and track keyword evolution over time (Contreras & Abid 2022; Van Eck & Waltman 2010). In parallel, the Biblioshiny software in RStudio is used for bibliometric mapping, creating visual representations of data and trends in the evolution of topics over time, allowing for detailed and comprehensive bibliometric analysis (Thangavel & Chandra 2023). Integrating these tools can provide a more robust analytical framework,

allowing researchers to visualize complex data and perform in-depth reference reviews.

3.3 Publication statistics

The descriptive analysis shows that the total number of citations for 964 articles in 347 journal sources was 17,297. The average number of citations per article was 17.94, while the h-index was 75. Figure 1 illustrates the publications and citations in studies on IRT and SRD from 1990 to November 2024. The slow publication growth from 1990 to 2009 shows that this research field had not yet received attention. Since 2010, the number of publications has increased rapidly, especially in 2016–2024, with a peak in 2023. This trend reflects that IRT research has become an area of great interest in the academic community, associated with the increasing awareness of sustainable development in rural areas in the context of globalization (Figure 1).

3.4 Most relevant authors/countries/sources:

Most relevant authors: These authors often have a significant number of scientific publications; their works are highly cited and significantly influence the scientific community. Table 1 shows a picture of the distribution of influence and contribution of authors in the research community, from the number of papers published to the level of citation and the distribution of contributions in collaborative research. Liu Y has the most significant impact, with 8 articles and 105 citations, reflected in a collaboration index of 3.75. Ciolac R and Iancu T have a high number of 184 citations, but a low number of articles fractional-

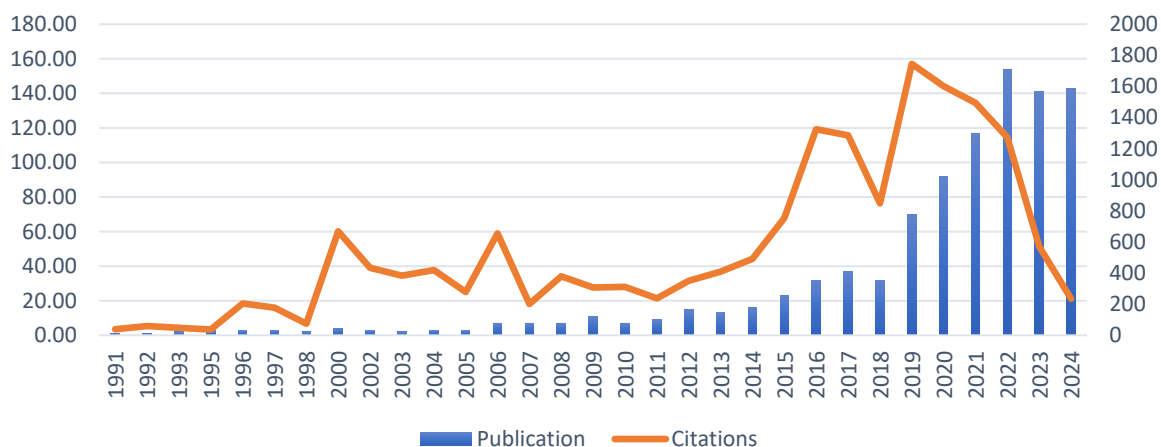


Figure 1. Total publications and cumulative citations (1990–2024).

Table 1. Distribution and influence of five highly cited authors in integrated rural tourism research.

Rank	Authors	Articles	Citation	Average citation/paper	Articles fractionalized
1	Liu Y	8	105	13.125	3.75
2	Ciolac R	7	184	26.286	1.07
3	Iancu T	7	184	26.286	1.07
4	Shen CC	7	71	10.143	2.27
5	Adamov T	6	184	30.67	0.97

ized at 1.07. Moreover, Shen CC has 71 citations, but the articles fractionalized at 2.27. Adamov T has 184 citations and records the lowest articles fractionalized at 0.97. They may be leaders or play important roles in large research projects and are the leading authors in research works.

Most relevant sources: The articles and the impact index show the importance of the current development of sustainable IRT and how these sources are related through articles published in influential journals. The research results in Table 2 show that SRD is becoming increasingly important in the context of globalization and climate change. Recent studies published in prestigious journals such as *Sustainability* (H-index 29), *Journal of Sustainable Tourism* (H-index 21), and *Land* (H-index 7) show a strong focus on sustainable development through IRT, especially in land resource management, environmental protection, and rural community support in line with the journal's objectives.

In addition, journals that tend to analyze the environmental impacts of rural tourism or are from the perspective of environmental protection and ecology in rural tourism, especially in sensitive areas of the ecological environment, are also of interest to many scholars.

Table 2. Refereed journals with most articles regarding integrated rural tourism.

Rank	Sources	Articles	H-index	Publication Year-start
1	<i>Sustainability</i>	172	29	2015
2	<i>Journal of Sustainable Tourism</i>	37	21	2011
3	<i>Land</i>	26	7	2020
4	<i>Environment Development and Sustainability</i>	20	7	2019
5	<i>Journal of Environmental Protection and Ecology</i>	19	3	2006

Most cited countries and countries' scientific production: Knowing these countries will help researchers quickly identify important research topics and influential scientific areas. Furthermore, it is a basis for international cooperation to promote the development of international research and participate in learning and applying advanced research methods. Table 3 analyzes the relationship between scientific output and the level of influence through citations of the top five countries; the results provide insights into each country's overall scientific output and its influence in the research field.

Countries' scientific production: China ranked No. 1 with 287 published articles, a significant difference from other countries in the ranking. This shows that China is investing and focusing heavily on research and development activities, becoming a powerhouse in global scientific development. The United States ranked No. 2 with 53 articles, followed by Spain, Italy, and Romania. The significant difference in the number of products between China and other countries reflects the great scale and influence of Chinese science in this research field.

Most cited countries: Regarding scientific capacity, China again affirmed its No. 1 position, followed by the United Kingdom, USA, Spain, and Italy. However, despite the advantage in the number of publications, average article citations are much lower than those of the other countries in the top five rankings. This shows China's strategy of investing and focusing heavily on research and development activities, becoming a powerhouse in global scientific development. Other developed countries such as the USA, UK, Spain, and Italy are also in the leading group, demonstrating their traditional position in this field.

3.5 Collaborations between countries

Figure 2 is a map that visualizes the network of scientific and academic collaborations between countries worldwide from 1990 to 2024. This shows that China is playing an increasingly important role in the global research ecosystem, becoming a key scientific collaboration center for the field of IRT. Besides China, countries like the USA, UK, Germany, France, and Italy emerged as significant branches in this network and developed early, before 2018. With their development advantages, these countries form densely connected clusters, reflecting the close cooperation between the

Table 3. Most cited countries and countries' scientific production on integrated rural tourism (1990–2024).

Countries' scientific production			Most cited countries			
Rank	Country	Publications	Rank	Country	TC	Average article citations
1	China	287	1	China	3714	12.90
2	USA	53	2	United Kingdom (UK)	1753	76.20
3	Italy	51	3	USA	1533	28.90
4	Spain	49	4	Spain	1128	23.0
5	Romania	38	5	Italy	1012	19.50

world's leading research centers and a long history of research on IRT development in SRT. In addition, Malaysia, Thailand, India, and Vietnam have also appeared from 2021 to the present, showing the connection, diffusion, and globalization of scientific activities beyond traditional centers.

3.4 Co-occurrence of keywords analysis

Using the software VOSviewer (version 1.6.17), 131 keywords from 4060 were included, based on a threshold of 10 occurrences, meaning only keywords appearing 10 or more times were analyzed. This eliminates rare or irrelevant keywords, improving analysis

accuracy. Table 4 shows the keywords representing the clusters. The clusters in the co-occurrence of keywords analysis show the main topic groups and the relationships between the keywords in each group (Figure 3 and Table 4). The keyword network shows the formation of six main clusters representing the main themes in the study. Each cluster consists of a group of closely related keywords, reflecting the trends and focuses in IRT research. Cluster 1 consists of 25 keywords, representing concepts such as community participation, livelihood improvement, cultural identity preservation, women's empowerment, and social impact. Cluster 2, with 23 keywords,

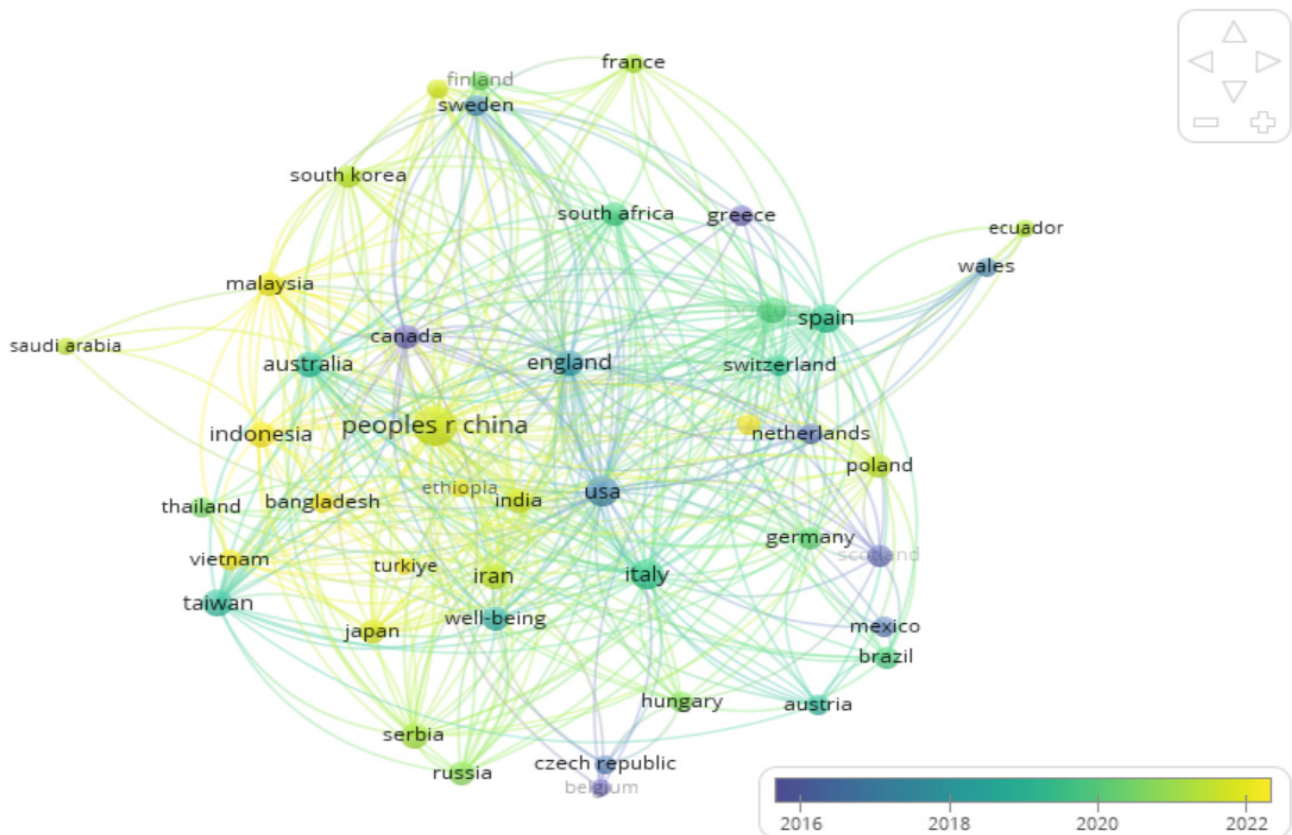


Figure 2. International research collaboration network in integrated rural tourism.

focuses on economic aspects such as economic impact, income diversification, infrastructure development, and investment in rural tourism. Cluster 3, with 24 keywords, focuses on environmental protection, conservation education, and circular economy development in the context of climate change. Cluster 4 includes 21 keywords, emphasizing the role of digital technology and innovation in tourism development. Cluster 5 includes 20 keywords, emphasizing the importance of governance and sustainable management in rural tourism development. Cluster 6 has 18 keywords, focusing on factors that improve quality of life, community health, and visitor satisfaction. Figure 3 illustrates the keyword co-occurrence network, showing the connections and correlations between the keyword clusters. The keywords in each cluster reflect the characteristics of a core research interest and the contributions of each field to SRD through IRT.

3.6 Temporal trends and thematic mapping analysis

In addition, through RStudio bibliometric analysis of Biblioshiny, we generated the density and central-

ity of keywords based on their temporal evolution. Based on the latest trend (2024), the keywords that were used a lot were “land use” and “environmental impacts.” Meanwhile, the keywords “agritourism,” “well-being and good health,” and “sustainable rural development” appeared simultaneously with high density in 2021. Other high-density keywords such as “responsible tourism” and “ecotourism” appeared to have high density in 2020 (Figure 4).

In addition, we analyzed a thematic map to identify niche, emerging, or declining topics and underlying topics (Figure 5). Thematic maps were created using author keywords from the 964 publications in the database that had been searched and screened previously. This presents a thematic map categorizing key topics in SRD research based on their development degree (density) and relevance degree (centrality). Topics in “satisfaction” “community participation,” and “eco-inovation” are in the Motor Themes quadrant, indicating high relevance and development. Basic Themes, such as “rural tourism,” “sustainable tourism,” and “rural development” are emerging but still developing. Topics in the Emerging or Declining Themes quadrant (lower-left), like “biodiversity con-

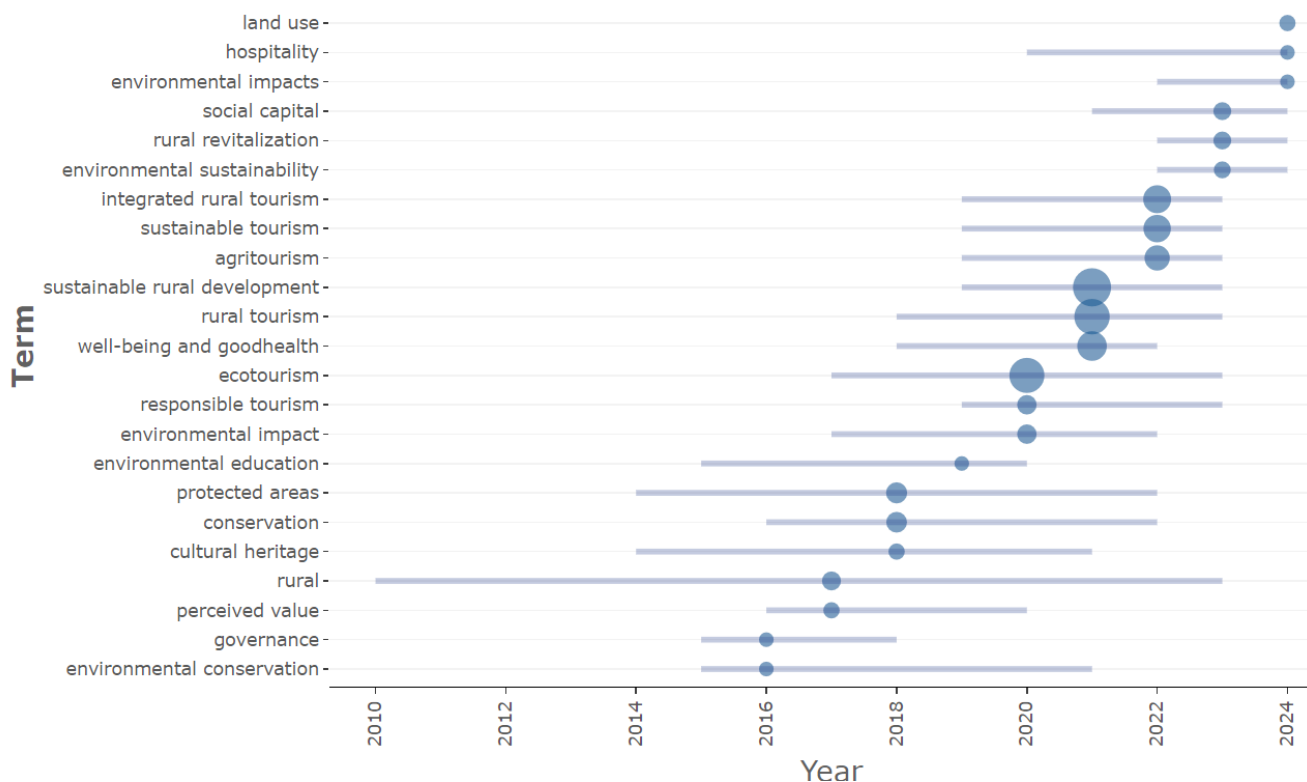


Figure 4. Temporal trends of research topics in integrated rural tourism.

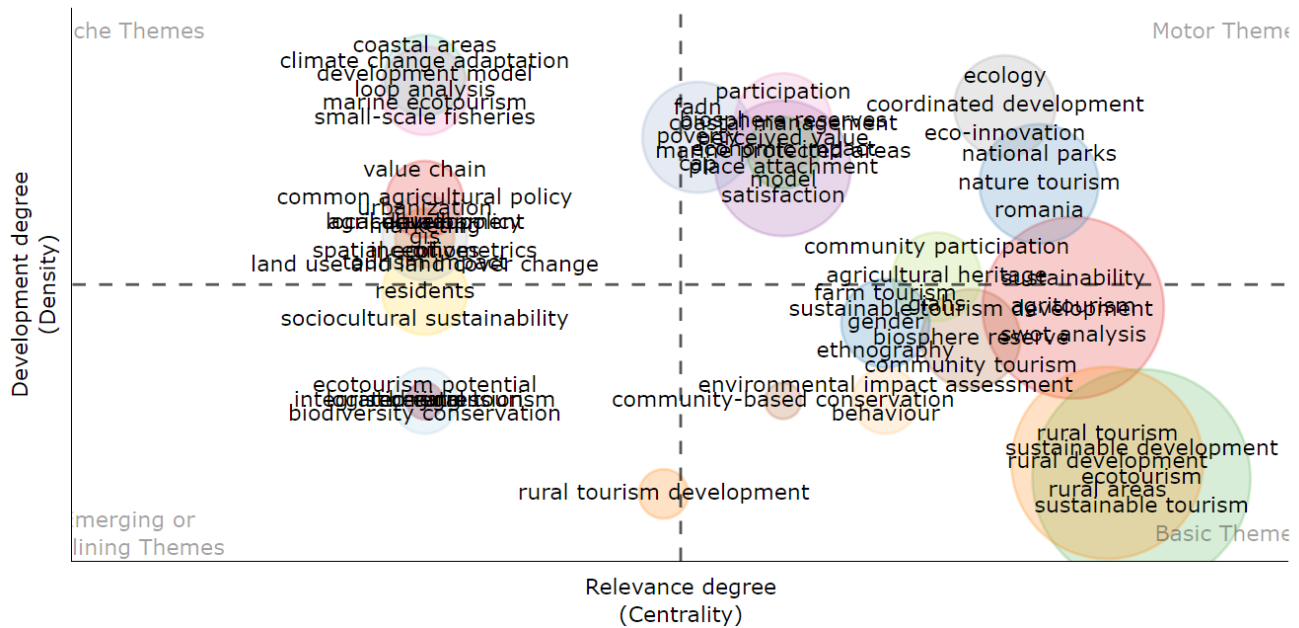


Figure 5. Thematic map of integrated rural tourism research trends.

ervation" and "sociocultural sustainability" have lower current relevance but are gaining importance for future research. In addition, Niche Themes such as "climate change adaptation", "coastal area", and "marine economics" show significant development but are less central in current studies. This map (Figure 5) highlights the evolving focus on SRD and IRT, particularly environmental and community-based conservation approaches.

4. Discussion

4.1 Discussion of research clusters

Cluster 1 – Integrated Tourism, Rural Communities, and Social Development: This cluster highlights the role of IRT in fostering community development, enhancing livelihoods, and creating socioeconomic impacts for local populations. IRT serves as both an economic sector and a tool for promoting sustainable development through community participation (Saarinen & Leno 2014). By engaging local people as tourism service providers, tour guides, homestay owners, or handicraft producers, IRT generates employment, boosts income, and improves overall livelihoods (Baby & Kim 2024; Ramaano 2023b). Additionally, IRT facilitates cultural integration by allowing tourists to engage with local traditions, enhancing rural destinations' appeal, and fostering

mutual understanding (Ciric et al. 2021). Successful rural tourism initiatives often involve active community participation, promoting equitable development and empowering marginalized groups, particularly women and youth, to engage in decision-making and address gender equality (Dang & Phan 2023; Guo et al. 2023). Furthermore, IRT supports social capital development by encouraging collaboration among community members, fostering inclusion, and promoting local economic growth (Rocca & Zielinski 2022). IRT also plays a key role in preserving cultural identity and heritage by facilitating cultural exchange and raising awareness of traditional values (Tang & Xu 2023; Zhang et al. 2024; Yang et al. 2022). Ultimately, IRT strengthens community and social participation, forming the foundation for sustainable rural development (SRD).

Cluster 2 – Integrated Rural Tourism and Sustainable Economy: IRT is important in promoting economic and sustainable development in rural areas (Baby & Kim 2024; Bannor et al. 2022). Analyses by (Bannor et al. 2022; Giaccio et al. 2018) combining tourism with agricultural activities and cultural heritage conservation has created many investment opportunities, diversifying income sources and improving infrastructure, helping rural communities develop economically and ensuring sustainable environmental and cultural conservation. Developing local

products, accommodation in agricultural tourism, and ecotourism development to stimulate value growth, strengthen connections between tourists and local people, and contribute to the sustainable development of the local economy (Oliver & Jenkins 2003; Quaranta et al. 2016). Some authors have suggested that improving tourism infrastructure, such as transportation systems, accommodation, and public utilities, benefits not only tourists but also local communities (Brune et al. 2021; Thakur et al. 2024). In addition, from the perspective of Rocca and Zielinski (2022), IRT stimulates investment by connecting rural tourism businesses, agriculture, and local industries. This integration enhances the value of agricultural products, increases tourist traffic and promotes economic revitalization. The increased demand for rural tourism also encourages investment from the government and the private sector in infrastructure development projects and sustainable initiatives.

Cluster 3 – Sustainable Ecotourism and Rural Development: Recent research has focused on integrating environmental protection with SRD, especially in the context of climate change and the growing demand for responsible tourism (Chen et al. 2023). Ecotourism is an important element in the sustainable development of rural areas, raising awareness and education about environmental protection. Through educational programs at destinations, ecotourism helps tourists realize the importance of protecting natural resources and supporting sustainable development goals (Fang et al. 2018; Ivona 2021). Responsible ecotourism practices contribute to promoting sustainability in rural areas, from economic growth and strengthening social structures to environmental conservation (Chiu et al. 2014; Mary et al. 2024). Circular economy in rural tourism optimizes resource use and minimizes negative environmental impacts through resource reuse, recycling, waste reduction, and the promotion of renewable energy, thereby protecting ecosystems and promoting sustainable development (Mihai et al. 2021; Rodríguez et al. 2020). IRT can restore degraded areas by combining economic activities and environmental protection, benefiting the local economy and ecosystem (Hatma Indra Jaya et al. 2024; Xiang & Yin 2020). The relationship between environmental protection and sustainable tourism development is becoming a key strategy to mitigate the impacts

of greenhouse gas emissions and climate change (Gabriel-Campos et al. 2021; Mancini et al. 2022)

Cluster 4 – Innovation and Integrated Tourism Technology for Rural Sustainability: This cluster highlights the important role of innovation and technology in IRT development, especially in the context of digital transformation and changing tourist demand, as represented by 21 keywords. Innovation and technology play an important role in developing SRD by improving operational efficiency, promoting cultural heritage, and contributing to socioeconomic growth (Ciolac et al. 2022; Hussain et al. 2023). Integrating AI technologies, supporting the resolution of sustainability challenges, enables efficient resource management and reduces environmental impacts in tourism activities (Jiang et al. 2023). Along with the development of technology and innovation in management through stakeholder empowerment and community-led models, it is essential for sustainable growth in rural tourism sectors (Rocca & Zielinski 2022; Zhao et al. 2011). In addition, business innovation helps to differentiate local businesses, increase community engagement, and promote social inclusion, in line with the SDGs (Antão-Geraldes & Sheppard 2020; Cosma et al. 2014)

Cluster 5 – Integrated Rural Tourism and Governance: Governance plays a key role in IRT with sustainable development, acting as an intermediary and coordinating the collaboration among different stakeholders to generate socioeconomic and environmental benefits (Apostolopoulos et al. 2020; Marzo-Navarro et al. 2017). Effective governance ensures that tourism development is consistent with the target ambitions of economic growth, cultural preservation, and environmental sustainability, promoting long-term benefits and minimizing potential negative impacts on rural areas (Cawley & Gillmor 2008; Dos Anjos & Kennell 2019). Effective governance helps manage and respond to fluctuations or risks such as natural disasters and epidemics, ensuring benefits for local communities and minimizing negative impacts, supporting economic growth and social stability in rural areas (Pennington-Gray et al. 2014). Implementing effective management rules ensures sustainable practices and wise destination management, using natural resources and cultural assets appropriately to maintain ecological balance and promote community welfare (Bichler 2021). Effective destination

management strategies involve establishing rules that support tourism infrastructure and environmental management, which help local communities benefit economically while maintaining ecological integrity and enhancing the visitor experience (Mihai et al. 2021).

Cluster 6 – Well-being and Good Health: IRT improves the quality of life of rural communities through employment opportunities, income generation, and infrastructure improvements, alleviating poverty (Baby & Kim 2024; Bannor et al. 2022; Ramaano 2023b). In addition, tourism activities also increase community connections, and local people can learn and exchange experiences, contributing to the construction and development of the local economy and society toward SDGs (Dang & Phan 2023). Rural integrated tourism not only can help protect the environment but also can contribute to improving the health of the community as well as tourists themselves. For example, resort tourism and health tourism activities can improve the physical and mental health of tourists, increasing tourists' level of satisfaction, as well as improving local communities (An & Alarcón 2020; Chen et al. 2023). In addition, IRT activities help tourists feel connected to nature, enhance relaxation, reduce stress, and increase tourist satisfaction with tourist destinations. The positive impacts of rural tourism on health, social development, and loyalty are considered important factors in promoting the sustainable development of rural areas (Leo et al. 2021). In addition, IRT can enhance the subjective well-being of women, where tourism development improves their quality of life and daily experiences (Cheng & Xu 2021; Pesonen & Komppula 2010).

4.2 Discussion on the implications of key trends and emerging themes

As the thematic map suggests, the underlying themes related to rural sustainable development provide a foundation for understanding core concepts and research areas related to rural tourism and sustainable rural development. Niche themes in the literature expand research on sustainable development issues, especially in coastal areas and industries related to fisheries, tourism, and climate change adaptation. The emergence of niche themes such as marine ecotourism, small-scale fisheries, and climate change adaptation underscores the importance of

sustainable practices in IRT. These elements create opportunities to connect tourism with environmental protection and community development and contribute to building more effective models of sustainable development. The core motto themes show how IRT impacts SRT in terms of economic, community, and environmental aspects that are harmonized to create a tourism model that is not only financially beneficial but also protects and promotes cultural and natural values, thereby promoting sustainable development for both the community and the economy. A core theme focuses on building a tourism model that supports economic growth, protects the environment, and improves the quality of life of local communities through sustainable development strategies. This theme reflects a holistic view of integrating creative, community, environmental, and economic elements into tourism development, in relation to the increasing emphasis on sustainable and environmentally friendly aspects of rural tourism development, including natural elements. The emerging/declining theme shows a deep understanding of the harmony between economic development and environmental protection, creating an integrated rural tourism model in which socio-cultural sustainability and biodiversity conservation in rural tourism development are linked with ecotourism. In addition, rural tourism development appears to intersect with the underlying theme that has profound implications based on the fundamental elements of rural sustainable development.

The elements of gender equality and heritage intersect with the underlying themes that underpin social welfare and equality development. The emerging themes related to the deep understanding of the elements of IRT development that impact SRT intersect with the underlying themes based on the elements of empowerment and heritage, which shows that many new approaches show an evolution in rural tourism development based on these underlying theoretical foundations. In contrast, the niche topics show much broader streams related to environmental protection from a new perspective on coastal tourism and climate change. Based on the image analysis, it is possible to provide an overview of the linkages between sustainable development, community empowerment, and environmental conservation in rural tourism, highlighting the relation-

ship between protecting natural resources, improving community life, and maintaining cultural values

4.3 Building the knowledge framework

Based on the analysis of IRT and SRD, we can easily see that the whole development process of this topic is very complicated; each stage has had different research directions and “hot topics.” These new research directions may be expanding or deepening existing topics; therefore, changes in research topics and directions are always moving and developing. Previous studies have conducted assessments and analyses of rural sustainability from different analytical perspectives. However, the existing studies have not yet established a knowledge framework, making it difficult for readers to obtain important information concisely and intuitively. Therefore, it is necessary to build a new valuable, comprehensive, and intuitive theoretical knowledge framework for research related to IRT’s impact on SRD, which will provide an overall picture of this field and directions for future research. The resulting research framework clearly and concisely presents the overall research relationships, essential stakeholders, and new research directions to provide valuable references for future studies (Figure 6).

4.4 Current challenges

The above analysis reveals that the impact of IRT on SRD includes a combination of various related topics. Combined trends inevitably complicate the relationship between movement and innovation in the topics, which opens up new interdisciplinary issues. Based on the above analysis and framework, the field faces the following challenges, which scholars and practitioners need to pay attention to, specifically:

(1) *Role of IRT in SRD remains ambiguous in prior studies:* While tourism boosts economic opportunities in rural areas, it can also result in environmental degradation and resource overexploitation. This raises questions: How can tourism be designed to benefit rural communities and safeguard local resources simultaneously? What conflicts of interest arise between tourism and other economic sectors? Lastly, what are the ethical responsibilities of stakeholders—local governments, businesses, and communities—in fostering sustainable tourism development?

- (2) *Transforming tourism enterprises’ business models:* Transforming from a traditional business model to a sustainable one requires tourism enterprises to change their operations and management. The challenge is how enterprises can maintain profits while applying sustainable principles, such as minimizing environmental impacts, protecting cultural heritage, and ensuring social equity.
- (3) *Resource management issues in sustainable tourism:* One of the major challenges in developing IRT and SRD is the rational management and use of natural and cultural resources. How do we balance the utilization of resources for tourism and their conservation?
- (4) *Changing tourist habits and awareness:* Although many tourists increasingly choose sustainable tourism, attracting and maintaining their participation in sustainable tourism activities remains a major challenge. How can we raise tourists’ awareness of the long-term benefits of sustainable tourism and encourage them to change their travel habits?
- (5) *Disparities in national resources:* Large countries have advantages in resources for developing tourism. Sustainable tourism can be difficult for countries and regions with limited resources. How can disparities in access to and implementation of sustainable tourism be reduced between regions, and in both developed and developing countries? How can equitable distribution of sustainable development in society be ensured between countries? Mechanisms must be established to support and share experiences and knowledge to ensure sustainable tourism can be implemented evenly and effectively in all localities.
- (6) *Integrating cultural and social factors into sustainable tourism is essential but presents challenges:* How can local cultural values be preserved without compromising their authenticity? With differing interests among community groups, how can conflicts in development methods and goals be resolved to achieve consensus? Furthermore, how can communities better understand the long-term benefits of sustainable development and adapt their perspectives to align with these trends?

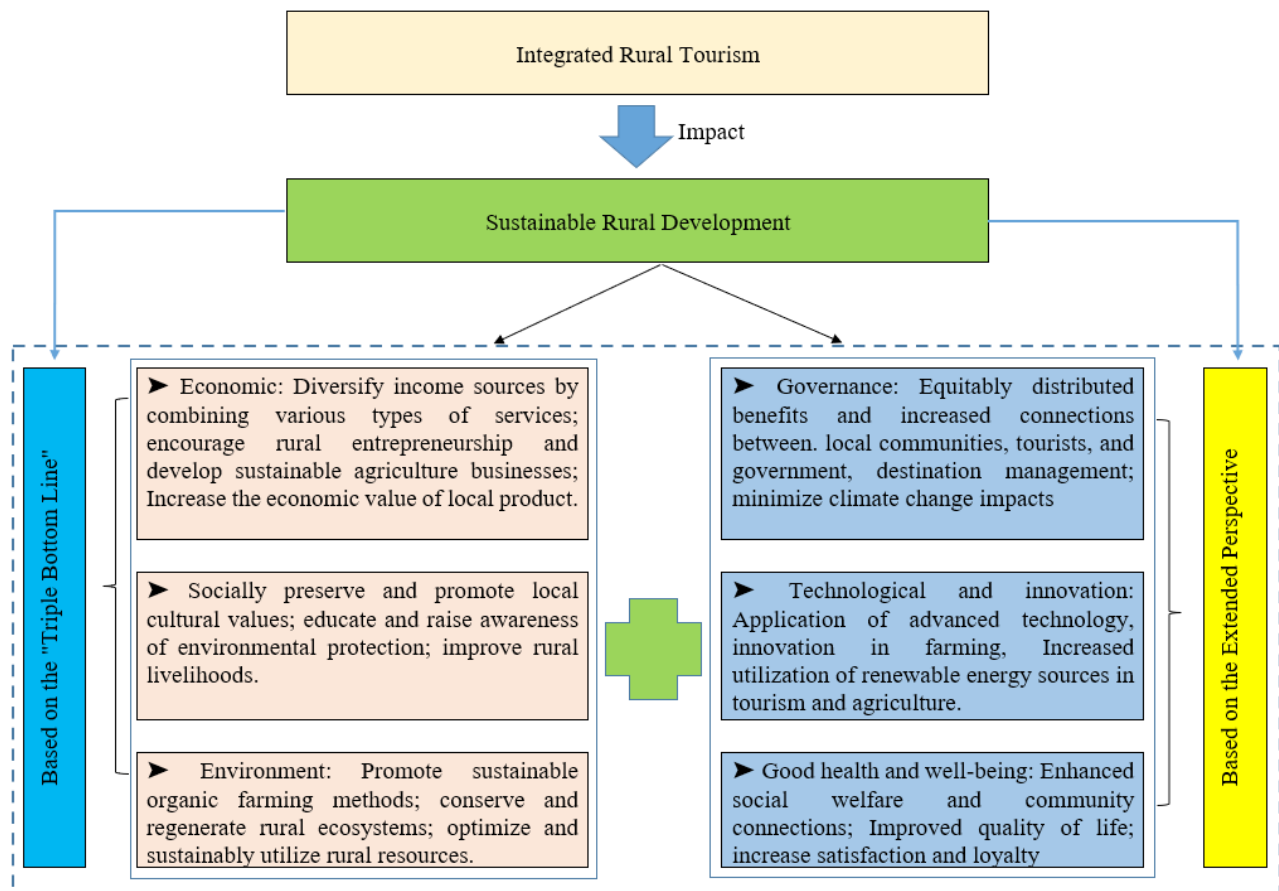


Figure 6. Knowledge framework for the impact of integrated rural tourism on sustainable rural development.

(7) *The method of achieving SRD is still vague:* Many detailed factors affect the effectiveness and efficiency of achieving sustainable tourism; these factors affect sustainable tourism differently. In addition, it is still unclear what detailed approaches can be used to achieve sustainability. Specific approaches may need to be designed to integrate with national and regional policies to synchronize sustainable development activities.

4.5 Future research direction

Research on sustainable development in rural areas is constantly growing, especially on IRT. This has led to a richness in approaches and a great change in its central themes and positions in each period. Therefore, researchers need to have a full and correct understanding of future research directions and characteristics in SRT development. Theoretically, we deduce the following research characteristics based on our current knowledge framework and challenge analysis.

- (1) *Developing climate-resilient coastal ecotourism models in rural areas:* Future research needs to explore the development of climate-resilient coastal ecotourism models. This includes studying the interactions between climate change, coastal ecosystems, and the communities that depend on these resources and developing tourism development strategies that minimize the impacts of climate change.
- (2) *Analyzing protection mechanisms and tourism development strategies that do not degrade the quality of land resources:* This may also include finding ways to minimize the negative impacts of tourism on the ecosystems and biodiversity of rural areas. It is essential to investigate the effects of climate change on coastal tourism destinations, particularly those with significant cultural heritage value. The research will help identify effective protection measures and sustainable tourism development in this context.

- (3) *Creative community tourism and preservation of local culture*: Future research will focus on developing creative community tourism models in which local communities actively create tourism products while preserving and promoting local cultural values. This research direction will seek ways to help rural communities maintain cultural traditions while developing tourism.
- (4) *Application of technology and innovation in rural tourism development*: New technologies such as VR, AR, or digital platforms must be studied to develop creative IRT products, attract tourists, and create economic opportunities for local communities while protecting and developing natural and cultural resources.
- (5) *SRD focusing on gender equality and empowerment of vulnerable communities*: This research direction will focus on developing sustainable IRT strategies in which women, children, and vulnerable groups can participate and benefit from tourism activities. The research will assess the effectiveness of sustainable tourism models in creating economic opportunities and development for these community groups.
- (6) *Social equity and benefit distribution in tourism development*: This research will explore how to ensure equity in the distribution of tourism benefits so that rural communities can benefit fairly from tourism development without causing social polarization.
- (7) *Research that can create tourism development models in which factors such as community welfare, natural resource protection, and tourist satisfaction are effectively integrated*.
- (8) *Green rural tourism and carbon emission reduction*: The study will focus on developing rural tourism models that protect the environment and contribute to reducing greenhouse gas emissions. These models may include promoting renewable energy, sustainable transport, and tourism activities that minimize environmental impacts.

5. Conclusion

Using VOSviewer and Biblioshiny, we performed a visual bibliometric analysis of documents from WoS from 1990-2024. The results showed the publication

trends of influential journals, authors, and countries. Furthermore, the analysis of the collaboration network of countries, together with the analysis and co-keywords, revealed that IRT impacts SRD with expanded perspectives to provide challenges and future research trends. Specifically, some key findings are as follows:

- (1) This trend reflects that IRT research has become an area of great interest in the academic community, associated with the increasing awareness of sustainable development in rural areas in the context of globalization.
- (2) The analysis of the collaboration network shows that major countries such as the USA, Italy, and the UK collaborate more frequently in this field, especially China, emerging after 2020, affirming its position in the quantity and influence of research. Additionally, the large population of China may also contribute to its high level of scientific production. However, Asian countries have relatively weak global cooperation, implying that global cooperation should be expanded, especially in developing countries. In addition, development strategies have differences in the research approaches of countries, between prioritizing the production of many documents and focusing on high-quality publications.
- (3) Keyword co-occurrence network analysis shows that IRT impacts SRD with broader perspectives than traditional ones. In addition to the impact on economic improvement, social development, and environmental protection, many studies also focus on factors affecting technological innovation, governance, and the impact on welfare and good health. The challenges and research directions towards SRD are based on environmental protection policies, climate change adaptation, especially for coastal areas, and policies in land management for IRT. Researchers need to clearly understand the implications of these keywords to contribute valuable findings in this field.

This study is innovative. From a knowledge perspective, we analyzed and reviewed the research progress of IRT from the perspective of collaboration, influencing factors, and co-phenomena. This analysis is full-scale, multidimensional, and integrated to pro-

vide sufficient information for readers to understand the dynamics of this field. Theoretically, we have built a new knowledge framework for this field, facilitating a clearer, more vivid, and faster understanding of the logical structure and development of SRD based on tourism development. Practically, we identify the current challenges and characteristics of future research, guide scholars to identify more appropriate research concerns, and continue to practice more effective research in the future.

There are some limits, however. Firstly, as researchers using the WoS for the data search sources, we limit the wide range of sources found in the scientific community. Secondly, our limitation is only "articles," so many works have not been studied. Furthermore, because the language chosen was English, valuable academic studies published in other languages may have been missed. Despite these limitations, the methodology we used was the best choice currently available for achieving the most accurate results possible. In the future, we will update the latest publications to conduct more in-depth analyses based on additional findings and will combine methods to develop a new research model. In addition, we will include more databases from other sources to make the results more representative. Furthermore, we will explore literature in other languages to gain a more comprehensive understanding.

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